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TOWNSEND and TOWNSEND and CREW LLP

By: hOliver

PATENT
Attorney Docket No.: 017769-000400US

#8
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

MICHAEL GRAETZEL, et al.

Application No.: 09/700,157

Filed: November 10, 2000

For: PRIMARY OR SECONDARY
ELECTROCHEMICAL GENERATOR

Examiner: Mark Ruthkosky

Art Unit: 1745

Declaration of Michael Graetzel, Francois Sugnaux and Nicholas Pappas under 37 C.F.R. §1.131

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

We, Michael Graetzel, Francois Sugnaux and Nicholas Pappas, being duly warned that willful false statements and the like are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001, and may jeopardize the validity of the patent application or any patent issuing thereon, state and declare as follows:

1. All statements herein made of our own knowledge are true and statements made on information or belief are believed to be true. Exhibits 1 and 2 are attached hereto and are incorporated herein by reference.

2. At the time this invention was first conceived, we were a Professor (M. Grätzel) and a Research Assistant (Dr. N. Pappas) at the Ecole Polytechnique Fédérale de CH-1015 Lausanne Switzerland (EPFL//Swiss Federal Institute of Technology), and a Director of

A.L.

ANP

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Application No.: 09/700,157,065
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Devex, Ltd. CH-1618 Châtel-St.Denis, Switzerland (Dr. F.R. Sugnaux). All the activities described in this declaration took place in Lausanne, Switzerland.

3. In accordance with 35 CFR §1.131, we completed the claimed invention in the Lausanne, Switzerland prior to December 17, 1997, which is the 102(e) filing date for the Frech et al. reference (U.S. Patent No. 5,958,624).

4. Attached to this Declaration are Exhibits 1 and 2, the dates on the Exhibits may have been redacted. All redacted dates are prior to December 18, 1997

5. Conception of this invention is evidenced by the following Exhibits 1 and 2. They are pages from our laboratory records (engineering notebooks?) and are in printed form. Exhibit 1 (four pages) are a proposal for the project "EVALUATION OF NANOPARTICULATE ELECTRODES AND NOVEL ELECTROLYTES FOR LITHIUM ION BASED TRACTION BATTERIES" addressed and submitted to the "Swiss 35 Battery Project Management" on June 6, 1997. This is certified by the explanatory remarks of Dr. N. Pappas, who is one of the inventors. The dates and prints on top and at the bottom of the individual pages of the project proposal indicate the time and date when the document was sent to the European patent attorney handling this patent matter on behalf of the applicants.

Exhibit 2 (seven pages and one page list of report files) is a project report addressed to Dr. Leo Dubal to "Swiss 35 Battery Project Management", the authority that supported the project.

6. Exhibits 1 and 2 are provided as evidence of diligence and continuous activity relating to the invention immediately prior to December 18, 1997.

Exhibit 2 is a print out of the report file marked "3S report Wed, Dec 3, 1997, 11:31". The report summarizes the result of the project at the time first half December 1997. Part of these results was later filed as the European Patent Application EP 98810431.1 on May 12 1998. This European Patent Application is the Priority Application for the PCT Application WO 99/59218 which is the basis for US Patent Application No.: 09/700,157.

NP *[Signature]*
F.legx F

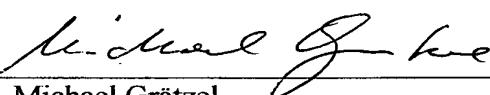
Attention is drawn to Fig. 3, Fig. 5, Fig. 6, Fig. 7, Fig. 8 and Fig. 9 of Exhibit 1 that correspond to the following Figures of US Patent Application No.: 09/700,157:

Fig. 3 of Exhibit 1 corresponds to Fig. 5 of US Patent Application No.: 09/700,157;
Fig. 5 of Exhibit 1 corresponds to Fig. 3 of US Patent Application No.: 09/700,157;
Fig. 6 of Exhibit 1 corresponds to Fig. 6a of US Patent Application No.: 09/700,157;
Fig. 7 of Exhibit 1 corresponds to Fig. 6b of US Patent Application No.: 09/700,157;
Fig. 8 of Exhibit 1 corresponds to Fig. 5a of US Patent Application No.: 09/700,157;
Fig. 9 of Exhibit 1 corresponds to Fig. 5b of US Patent Application No.: 09/700,157;

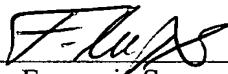
7. Declarants respectfully submit that the facts provided in this Rule 131 declaration are sufficient to evidence invention prior to December 18, 1997.

8. Declarants have nothing further to say.

Dated: November 11, 2002

By: 
Michael Grätzel

Dated: November 11th, 2002

By: 
Francois Sugnaux

Dated: November 12, 2002

By: 
Nicholas Pappas

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Exhibits 1A-C, 2A-H

June 6 1997

file → lithium Cell OPEN-3

S002

Evaluation of Nanoparticulate Electrodes and Novel Electrolytes for Lithium Ion Based Traction Batteries

Proposed by:

Dr. N. Pappas and Prof. M. Graetzel Institut de Chimie-Physique II E.P.F.L. CH-1015 Lausanne	Phone: (021) 693 6124 Fax: (021) 693 6100	Prof. H. Hofmann Lab. de Technologie des Poudres E.P.F.L. CH-1015 Lausanne	Phone: (021) 693 36 07 Fax: (021) 693 30 89

Industrial Partners:

Dr. I. Exnar Renata A.G CH-4452 Itingen.	Phone: (061) 971 81 81 Fax: (061) 971 49 79	Dr. F. R. Sugnaux Xolox/Devex CH-1618 Châtel-St.Denis	Phone: (021) 948 7808 Fax: (021) 948 9127
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This proposal concerning mesoporous battery materials was submitted to the Swiss 3S battery project management on June 6, 1997

Lausanne , 25 October 2002

N Pappas

Evaluation of Nanoparticulate Electrodes and Novel Electrolytes for....

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The "Laboratoire de Technologie des Poudres" (LTP, Prof. Hofmann) will be responsible for:

- i) the synthesis of the nano-particulate oxide materials to be used as cathodes as specified above by co-precipitation,
- ii) the processing of the powders (or powder composites with graphite) into electrodes by pressing and sintering, and
- iii) for the characterisation of the cathodes, in particular with respect to surface area and porosity.

The "Institut de Chimie Physique II" (LPI, Prof. Graetzel) will be responsible for:

- i) the sol-gel synthesis of the nano-particles,
- ii) the electrochemical characterization of the electrodes,
- iii) the testing of novel electrolytes based on organic and ionic liquids, and
- iv) will carry out together with the industrial partners initial performance tests of batteries.

v) scale-up of electrode size and thickness towards a low-cost high power density cell by modeling pore diffusion and current collector design.

The two industrial partners Renata A.G. and Xolox/Devex S.A. will:

- I) develop batteries respectively made from pellets and thick film electrodes.

4) Resources available

At EPFL: equipment for preparation of oxide powders and films (autoclaves, reactors, grinding mills, spray drying apparatus, sintering ovens etc.), for characterization of the morphology of porous electrodes (BET, SEM, porosimeters, profilometers etc.) and processing as well as for electrochemical characterization are available. Some equipment for electrochemical characterization is available but this is insufficient.

At Renata A.G in Itingen: Routine battery testing equipment is available

By Devex/Xolox : Current collectors could be provided .

5) Requested Subsidies

Both the LPI and the LTP will as of June 15 place an experienced scientist full time on the project. The salary of 100 kFr/year is an average for an employee in class 20 on the federal salary scale.

What is urgently needed to launch the investigations is:

- a glove box (50kFr) and
- an ac impedance frequency analyser (40kFr).
- chemical precursors to make powders and films

1) Introduction

The rechargeable Li-ion battery is a promising candidate for a safe high-density high energy supplier for applications like car traction. LPI/EPFL has developed a coin cell jointly with Renata showing promising performance for watch applications. The features of this Li-ion battery are described in annex 1. The present project aims to demonstrate feasibility of developing a traction battery that would be competitive on the market.

2) Objectives and milestones until the end of the 1997

The goal of this project is to synthesize and process these intercalation host materials in the form of pellets and films and to establish that the mesoporous morphology presents an advantage for the operation of the cathode as well as the anode. While for TiO₂ as anode material the positive effect of nanocrystalline morphology on electrode performance has already been established investigations are lacking on the cathode side. Therefore we propose:

- i) the synthesis of Li intercalation hosts LiM_xO_y (M= Mn, Ti,V, Co, Ni) in the form of nano-crystalline particles by sol-gel or co-precipitation methods and
- ii) the control the particle size (i.e. the control of the growth and aggregation mechanisms) for optimum porosity of the mesoporous films to ensure fast lithium intercalation.
- iii) the performance of these mesoporous oxide materials to be assessed and compared to oxides having conventional morphology.

3) Work Plan

Apart from the lattice structure, the performance of a lithium battery (i.e. its capacity, cycle life and electric energy storage efficiency) depends on the morphology of the host solid, which is related to particle size and surface texture. It has been demonstrated that only a small part of the host particle is used as an active insertion material and by decreasing the particle size to the nanometer range, the performance of the batteries should be dramatically increased. Many pathways are now available for the synthesis of nano-sized ceramic powders, but the processing of these powders (e.g. formation of a suspension with high solid content, pressing into a dense pellet) remains problematic. These processing difficulties are related to the very high surface area. Therefore, a close control of the surface forces should lead to a successful processing. For the next 6 months we shall concentrate on two major methods of oxide synthesis:

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It is also desirable for LPI/EPFL to dispose of:

- a high current potentiostat,

which presents additional 40kFr presenting total investment for equipment of 130 kFr.

	per year	for 6.5 months
Laboratoire de Technologie des Poudres, EPFL Personnel: 1 scientist (class 20)	100 KFr	54 KFr
Institut de Chimie Physique, EPFL Personnel: 1 scientist (2.5 years)	100KFr	54 KFr
Material		130 Kfr
Total		<u>238 Kfr</u>

6) Financing proposal

At the cost of the OFEN: salary 12 months researcher Fr. 108'000.- and 130'000.- in equipment.

At the cost of the industrial partner: small consumption materials (10'000) services, adaption of industrial Infrastructure (30'000.-), manpower principal investigators (Drs Exnar and Sugnaux) :800 h at 150 Fr./h = 120'000.- Fr., engineer 500 h at 100 Fr/h = 50'000 technician 600 h at 65 Fr/ = 39'000.-. The total amount is 249'000.-

No overhead will be charged by EPFL for Prof. Graetzel's contribution and secretarial and other services.

Influence of the crystallite size of electrode materials on intercalation rate & capacity and novel electrolytes.

Abstract

A mesoscopic form of the spinel LiMn₂O₄ has been synthesized and studied for its electrochemical performance as a lithium ion insertion host material and for its application in the electrode fabrication destined for rechargeable batteries. Comparison with commercial materials indicate the advantages of nanometer sized material with respect to electrochemical reversibility, active material utilization and power density in a prospective thin-layer battery system. Electrolytes based on novel organic solvents and r.t. molten salts have been explored for their suitability and compatibility in envisaged lithium ion cells as evidenced by their electrochemical stability, low viscosity, the solubility of Li salts, low volatility and compatibility with the electrode materials. Computational models were developed for complete mesoporous thin-layer cell simulation at steady state, providing insight to the requirements concerning the electrolyte function in the 'rocking-chair' concept scale-up.

June 15th 1997 - December 15th 1997

Laboratory of Photonics and Interfaces (LPI/ICP2),
Ecole Polytechnique Fédéral de Lausanne (EPFL)
CH - 1015 Lausanne, Suisse.

N.Papageorgiou and M.Grätzel

tel: 021-6936124/3112, fax: 021-693 4111/6100

1. Objectives

Within the context of Ions-Lithium-Programme "3S" (Safety-Swiss-Scale-up), three basic directions of exploratory research have been pursued in order to investigate the feasibility of the above three fundamental premises for accumulator development exploiting lithium ion technology and particularly the 'rocking-chair' concept. Firstly, the investigation of the influence of particle size on cathode micro-kinetics with regards to the reversible Li^+ intercalation reaction in spinel LiMn_2O_4 . Secondly, the search for, as well as the examination of the application feasibility of novel solvent or molten salt/electrolyte systems either synthesized by our group or commercially available, in terms of electrochemical/chemical stability and their suitability as lithium ion cell components. Thirdly, the mass-transfer modeling of the thin-layer nanocrystalline electrode able to provide insight into the requirements of an effective electrolyte under any given steady-state performance conditions and physical cell/electrode configuration, which in combination with the previous two investigations, would ultimately indicate the scale-up potential of this system. This has embodies the safety aspect by considering only non-water sensitive and low toxicity materials for electrodes and electrolytes.

2. Activities and Results

2a. Scope and option evaluation

The spinel LiMn_2O_4 has been studied as the cathode material for rechargeable lithium batteries because it is less expensive, less toxic, and can be prepared by an easier method than the e.g. cobalt oxides. However, the performance of lithium ion rechargeable cells is mostly limited by the diffusion of the lithium ion into the host material. Further improvements of the charge-discharge performance of LiMn_2O_4 composite electrodes can be expected by designing an electrode structure of the host oxide with a nanoscopic character. The morphology should play a fundamental role in the electrode properties[1]. It has been demonstrated that the capacities LiMn_2O_4 electrodes were enhanced by decreasing the average grain size of the oxide[2]. The kinetics of reversible lithium insertion should also enhanced by reduction in the particle size of the oxide. In the charge discharge-discharge reaction, diffusion of Li^+ in the LiMn_2O_4 often determines the overall rate because its diffusion coefficient is as small as $10^{-9} \text{ cm}^2/\text{s}$, and the diffusion in the oxide becomes too slow to follow the applied reaction rate. The thickness of the oxide layer across which a lithium ion must travel can be reduced considerably by reducing the very size of the primary grain size. The shorter diffusion length makes the mean kinetics faster, resulting in a better utilization of LiMn_2O_4 , especially at higher current density. Therefore, controlling the nanoscopic morphology of the electrode material should largely define the application limits of a performing cell. Moreover, the 4 Volt Li^+ extraction-intercalation regime was chosen for this study, as the intended matching of the cathode material with any other anode would provide the highest possible energy and power density for the perspective battery system.

On the other hand, the Li^+ contained transferred via the electrolyte, should be effectively supplied to and removed from every point within the solid electrode during insertion and extraction, respectively. In order to rationalize the action of the electrolyte phase the mass-transfer of a thin layer cell at steady-state operation (constant current delivered) has been modeled, providing a first approach perception of the possible limitations imposed by the electrolyte function for given physical cell, diffusion parameters and current passed during charging/delivered during discharging.

2b. Thin layer electrode preparation, characterization and kinetic performance.

Commercial spinel LiMn₂O₄ materials, Selectipur and 5.2µm particle powders, were both supplied by Merck. Mesoscopic powders were produced by the LTP, EPFL group (see annexed full description). As electrolyte a 1M LiClO₄ in propylene carbonate was the standard electrolyte in all electrode cycling experiments to enable objective comparison. Thin film electrodes were prepared by a casting a aqueous mixture of the studied manganate powder with PVA (MW 100000) as binder and graphite particles (Lonza KS-10 or nanotubes) as the conducting matrix. The weight percentage of the constituents was chosen 3% PVA and 10% graphite. In one situation carbon nanotubes provided by the Dept.of Physics, EPFL were added to the paste blends. The pastes were cast on CTO substrates ambient dried and then heated in an air furnace for 15min at 200C.

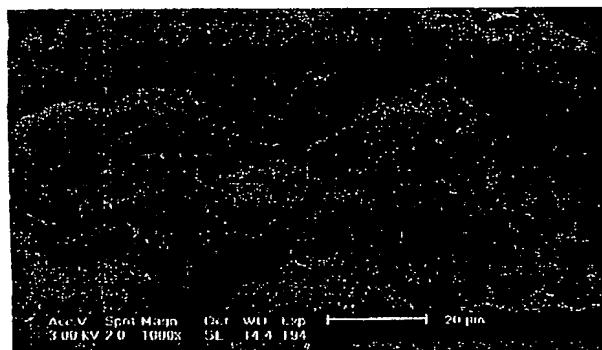


Figure 1

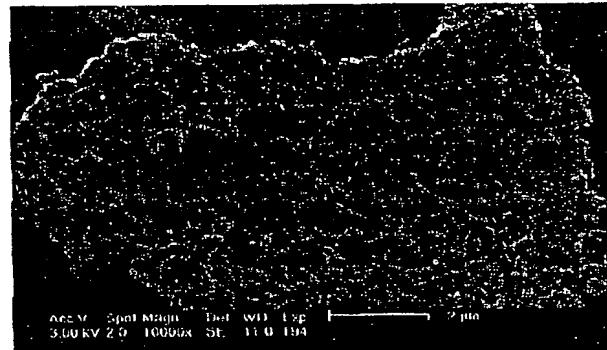


Figure 2

An electrode made from Selectipur is shown in Figure 1, with the particles surrounded by the flakes of the graphite additive. The Merck Selectipur is comprised of large hollow spheres (30nm) the walls of which appear on SEM to have primary grains of 100-200 nm, extremely tight merged packing, thus a relatively low porosity and surface area (see Figure référance 2). The SEM image of the electrodes using the nanosized powder does not differ from the one seen in the annexed section on the powder preparation from LPI, EPFL, denoted there as Fig.5.

Judging from the performance of the benchmark product Selectipur, sintering the primary particles in order to attain a bicontinuous porous network and thus a high connectivity should therefore be determinant to performance. Our original idea toward improving the manganates by imparting nanoscopic morphology can now be viewed as an extension to the Selectipur model: by retaining the connectivity and decreasing the primary particle to the nanometer range significant improvements to the intercalation properties are expected. Another issue concerns the conductivity of the network. Making intimate electrical contact within the active mass regardless of size and shape of the oxide, results in enhanced utilization of the oxide and is therefore very desirable. One approach studied was the graphite and nanotube addition, the other the sintering of the particles themselves.

Cyclic voltammetric information elucidated the kinetic aspects of the lithium insertion/extraction in the oxides of the above thin film electrodes. Figures 3 and 4 depict the voltammetric performance of sample electrodes under identical experimental conditions. The Selectipur and 5.2µm particle electrodes display higher irreversibility than the electrode from the mesoscopic powder sintered at 700C (Figure 3). Moreover, the electrodes from the mesoscopic materials are compared in Figure 4: the powder electrodes containing the graphite show very low capacity as well as low reversibility, while addition of nanotubes improves markedly both

capacity and reversibility. The sintered nanoparticles however are the best performer.

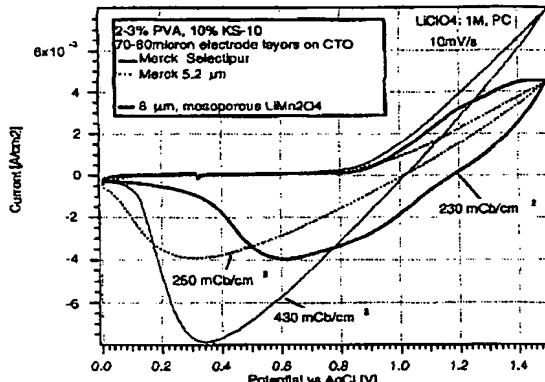


Figure 3

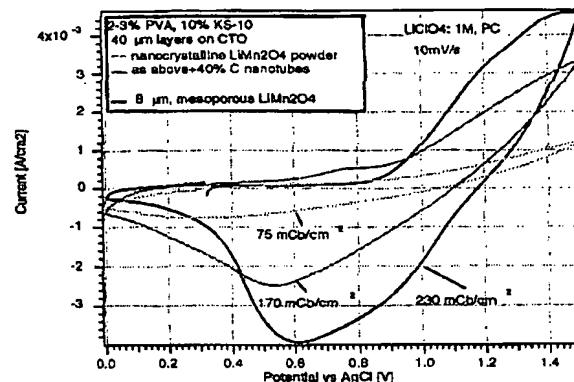


Figure 4

The preferential kinetics are also exemplified by the comparison of the Selectipur 30-40 μ m electrode the 8mm mesoporous layer. Under a potential scan of 100mV/s a 1.75-2mA/cm² delithiation current at 1.5Volts vs AgCl and 7.5 mA/cm², in both cases respectively. At 20mV/s a 1.25mA/cm² current was measured in the first case and 5mA/cm² in the second. The mesoporous layer shows a clear advantage over the even higher capacity (larger active mass) Selectipur electrode.

It is noted that the porosity of a typical sintered layer of the nanosized oxide of an average 8 μ m layer was estimated by mass to surface measurements to be as high as 70%. Very porous appear to be the layers in the case of 1.5 μ m sintered films, the behaviour of which is seen in Figure 5. An close to theoretical capacity (148 mAh/g or 532 Cb/g) is derived for these electrodes when considering a 70% porosity of the layer. The two insertion levels for the spinel in the 4Volt range reported in the literature[3] for 200nm layers at 0.05mV/s, appear very distinct for our 1.5 μ m thickness recorded at a sweep rate over two orders of magnitude higher, demonstrating the high

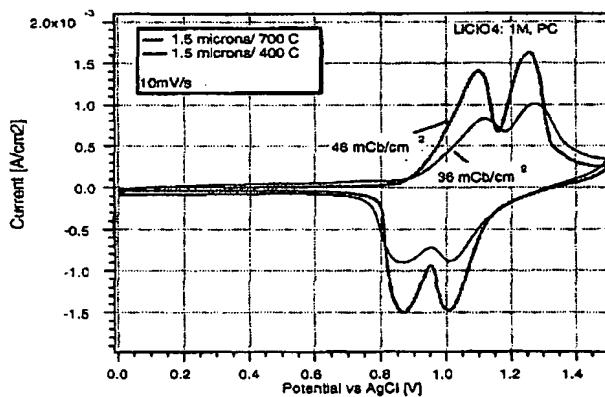


Figure 5

reversibility attainable by decreasing the particle size to the nanometer range and simultaneously ensuring effective particle connectivity.

2c. Electrolyte investigation and characterization

The sought for properties are generally low viscosity, low volatility, solubility of the lithium salt electrolytes and electrochemical stability/ chemical compatibility with the electrode materials. Our group has synthesized room temperature ionic liquid which have very attractive features in the above respects. The electrochemical stability limits fulfill the requirements for 4Volt cathode materials, as seen from the examples shown in Figure 6. The potentials are expressed versus iodide/tri-iodide which is +0.15Volts vs AgCl.

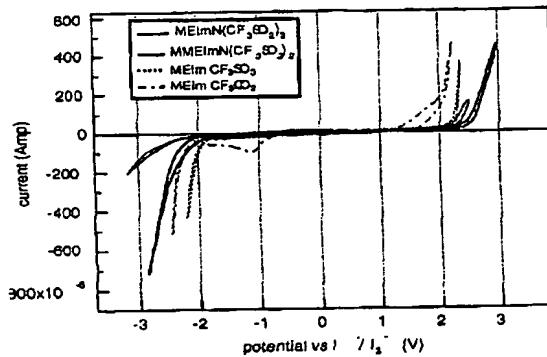


Figure 6

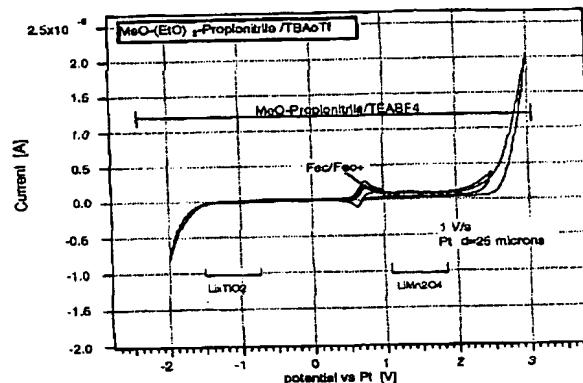


Figure 7

Solubility of more than 2M LiN(oTf)₂ can be reached in methoxy-diethoxy propionitrile (MeO-di-EtO-propionitrile) and in methoxy-propionitrile. The electrochemical stability of this newly synthesized organic solvent as evidenced by the electrochemical window is given in Figure 7. The corresponding stability range for methoxy-propionitrile is depicted by the bar in this figure, and the operation limits of the lithium hosts TiO₂ and manganate are positioned against this scale (ferrocene potential is +0.4Volts vs AgCl). These molecular structures have been designed to exploit the strong solvating properties of the ether groups toward Li⁺, combined with the low viscosity for Li⁺ diffusion and the relatively high boiling points of these compounds to decrease their volatility. Methoxy-ethoxy-propionitrile was also synthesized having viscosity 2.7cP, 1.1cP being for methoxy-propionitrile and 5cP for methoxy-diethoxy propionitrile. The boiling points are respectively 240C, 165C and at 10mmHg 152C.

2d. Thin layer cell mass-transport model

Steady-state model for the porous electrode intercalation cell. The cell configuration consists of two 1mm lithium intercalation mesoporous hosts separated by a 20μm inert and insulating porous spacer. The initial electrolyte concentration in monovalent Li salt is 1M and the free stream diffusion coefficient for Li⁺ in the electrolyte corresponds to the case of propylene carbonate (3 10⁻⁶cm²/s) of approx. 3cP.

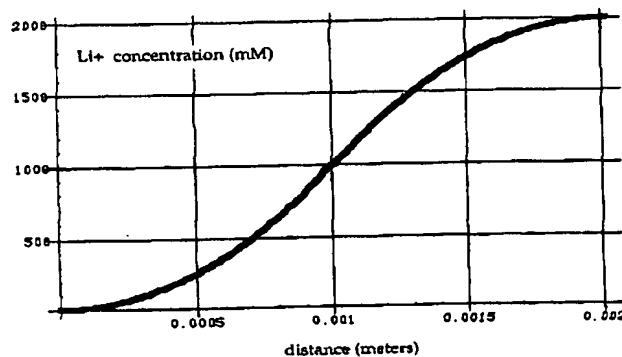


Figure 8

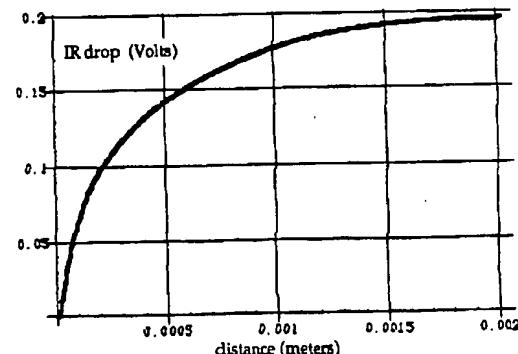


Figure 9

In the depicted results of the model the concentration profile of the Li⁺ (also the overlapping curve for the anion) appears in Figure 8 and the potential drop across the cell in Figure 9 when approx. 6 mA/cm² are passing the cell, the minimum current limiting the supply of Li⁺ to one side of the intercalating electrode. The conductivity of the host solid is not considered here. The electrode porosities were 50% and 90% for the spacer layer.

Of course, anything smaller than 1000mm would increase the limiting currents. It is noted that the absence of supporting electrolyte in this case aids the lithium ion diffusion or transport but at a cost of potential in the form of IR drop across the cell (here just under 0.2 Volts, as depicted in the Figure 9). This calculation reveals that for electrodes of 10mm in the above configuration, currents as high as 500mA/cm² are possible as far as electrolyte performance is concerned.

3. Collaboration

Preparation of nanometer sized particles was performed by LTP, EPFL. The laboratory of experimental physics, EPFL was kind in providing carbon nanotubes made in their electric arc facilities.

LiMn₂O₄ samples to PSI for cycle testing in pelletized forms. Whereas PSI will report on the experimental part, a brief description of the main result will be given below. Merck Selectipur and the 5.2mm were cycled for their capacity and compared to the nanoscopic powder produced by LTP, EPFL. The capacity in these very low current cycling tests appears similar for the Merck products and 25% lower for the nanometer grain size materials, but this should be an artifact of the temperature of the material preparation and possibly the ineffectiveness of the 6μm graphite conductor used in making the required intimate contact within all the much smaller sized particulate oxide mass in the later case.

4. Transfer to Practice

Prototype thin-layer microbatteries have been constructed in our laboratory from the 4μm LiMn₂O₄ sintered film in conjunction with a TiO₂ nanocrystalline electrode fabricated in our group using electrolytes containing the Li-imide salt and methoxypropionitrile or methyl-ethyl imidazolium imide molten salt, showing exceptionally high discharge currents (above 1mA/cm²) in a voltage domain of 1.5-2.4Volts. This type of performance is promising and actually appears to exceed the requirements for lithium microgenerators suitable for commercialization.

5. Perspectives for 1998- future

The development of mesoporous lithium manganate electrodes demands further research effort. To point out a few items:
Temperature annealing and its effect on material properties and sintering studies.
Development of thicker layer deposition techniques. Study thickness increase versus performance.
Comprehensive modeling of the electrolyte as well as the solid diffusion phenomena in mesoscopic layer or other configuration electrodes.
Substrate options for lateral conductivity optimization of electrodes and larger module design.
Microcalorimetry measurement under operation conditions in order to ascertain the stability of electrodes and possibly of complete cells.
Synthesis of nanocrystals smaller than 30nm. Admetal modified LiMn₂O₄ and its effects on morphology, conductivity and electrochemical performance.

6. Publications

The publication of this work with the addition of supplementary fundamental experiments is envisaged for the near future.

References

1. S.D.Han et al., *Mater. Sci. Forum*, 152-153 (1994), 217-220
2. F.K.Shokoohi et al., *J. Electrochem. Soc.*, Vol.139, No. 7, (1992), 1845-1849.
3. W.Liu et al., *J. Electrochem. Soc.*, Vol.143, No. 3, (1996), 879-884.

This document was submitted as a report to the Swiss 3S battery research program management (Dr. Leo Dubal) on December 3rd 1997, as shown by the print-out of the computer files of Dr. Nicholas Pappas (Papageorgiou), which is attached.

Lausanne, 25 October 2002

N.Pappas

21 items, 22.50 GB available

Name	Date	Type
► reports3S_99	Thu, Feb 24, 2000, 18:45	— folder
► report Dubal_Dec98	Tue, Nov 9, 1999, 11:14	— folder
► 3S report_revised1	Tue, Oct 20, 1998, 11:34	1.9 MB Microsoft Word 1.x-5.x doc
► Li cell patent	Sat, Apr 18, 1998, 11:47	— folder
► mesoporous cell_1	Wed, Apr 15, 1998, 18:44	16 K ClarisDraw document
► mesoporous cell	Fri, Mar 20, 1998, 15:26	20 K ClarisDraw document
► report RV1	Fri, Jan 9, 1998, 10:51	684 K Microsoft Word 1.x-5.x doc
► report RV	Fri, Jan 9, 1998, 10:06	1.6 MB Microsoft Word 1.x-5.x doc
► Proposal 16Jan	Wed, Jan 7, 1998, 18:10	12 K Microsoft Word 1.x-5.x doc
► Projet 98/99	Wed, Jan 7, 1998, 12:29	12 K Microsoft Word 1.x-5.x doc
► 3S report_revised	Tue, Dec 16, 1997, 18:18	1.2 MB Microsoft Word 1.x-5.x doc
► 3S 12Dec_slides	Thu, Dec 11, 1997, 16:49	1.2 MB Microsoft Word 1.x-5.x doc
► 3S report	Wed, Dec 3, 1997, 11:31	1.2 MB Microsoft Word 1.x-5.x doc
► 3S meeting12 Dec.	Sat, Nov 22, 1997, 20:58	40 K Microsoft Word 1.x-5.x doc
► 3S meeting 23Oct.	Mon, Oct 20, 1997, 20:00	2.5 MB Microsoft Word 1.x-5.x doc
► Lithium Cell OFEN_3	Fri, Jun 6, 1997, 12:03	16 K Microsoft Word 1.x-5.x doc
► Lithium Cell OFEN_2	Thu, Jun 5, 1997, 18:32	12 K Microsoft Word 1.x-5.x doc
► Lithium OFEN_1definite	Wed, Jun 4, 1997, 18:09	12 K Microsoft Word 1.x-5.x doc
► Lithium final	Tue, Jun 3, 1997, 19:12	20 K Microsoft Word 1.x-5.x doc
► Lithium cell project OFEN(N.P.)	Tue, Jun 3, 1997, 18:13	20 K Microsoft Word 1.x-5.x doc
► Lithium cell project OFEN	Tue, Jun 3, 1997, 17:24	20 K Microsoft Word 1.x-5.x doc